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10/551,045	12/02/2005	Marco Pizzi	4636-33	4667

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EXAMINER	
TUMMINELLI, ALEXANDER S	
ART UNIT	PAPER NUMBER
4145	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/551,045	PIZZI, MARCO	
	Examiner	Art Unit	
	ALEXANDER S. TUMMINELLI	4145	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-10* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-10* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *27 September 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *20050927*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

1. Claim 5 objected to because of the following informalities: "Schottky" is spelled "Shottky". Appropriate correction is required.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claim 8 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claim 8, the phrase "for instance" renders the claim indefinite because it is unclear whether the limitation(s) following the phrase are part of the claimed invention. See MPEP § 2173.05(d).

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1-2 and 4-7 are rejected under 35 U.S.C. 102(b) as being anticipated by Unal et al ("Spectral response of porous silicon based photovoltaic devices").

Regarding claims 1 and 6, Unal et al teaches a junction, in particular for photovoltaic cells, optical sensors or the like, comprising a layer made of a first

microporous or nanoporous material (Fig. 1) chosen among silicon (page 3548/col. 1/paragraph 4), gallium antimonide or gallium arsenide, and a layer made of a second material chosen between a metal or a semiconductor (page 3548/col. 2/paragraph 3), deposited onto the layer made of said first porous material, characterized in that the pores of the layer made of said first material are at least partially filled with the aforesaid second material (page 3548/col. 2/paragraph 3).

Regarding claim 2, Unal et al teaches all of the limitations as stated above. Regarding the method limitation of the second material is deposited onto the pores of the first material by means of electrochemical deposition techniques, the examiner notes that even though a product-by-process is defined by the process steps by which the product is made, determination of patentability is based on the product itself. In re Thorpe, 777 F.2d 695, 227 USPQ 964 (Fed. Cir. 1985). As the court stated in Thorpe, 777 F.2d at 697, 227 USPQ at 966 (The patentability of a product does not depend on its method of production. In re Pilkington, 411 F.2d 1345, 1348, 162 USPQ 145, 147 (CCPA 1969). If the product in a product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process.).

Regarding claim 4, Unal et al teaches all of the limitations as stated above. Unal et al also teaches a photovoltaic cell, characterized in that it comprises a junction (abstract).

Regarding claim 5, Unal et al teaches all of the limitations as stated above. Unal et al also teaches a cell, characterized in that the first material is porous silicon and in

that the surface of porous silicon is covered with metal nanoclusters (page 3548/col. 2/paragraph 3), which carry out at the same time the Schottky junction and the conductive layer required for transmitting the general charge to exploiting means (Fig. 1).

Regarding claim 7, Unal et al teaches all of the limitations as stated above. Unal et al also teaches a process, characterized in that said first material is obtained by anodization in a bath of hydrofluoric acid (page 3548/paragraphs 4 and 5).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

8. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Unal et al ("Spectral response of porous silicon based photovoltaic devices"), as applied to claim 1 above, in view of Carlson et al (US 4142195).

Regarding claim 3, Unal et al teaches all of the limitations as stated above. However, Unal et al does not explicitly teach an ITO layer deposited above the layer made of the second material.

Carlson et al teaches a junction, characterized in that an ITO layer is deposited above the layer made of the second material (Fig. 1/part 24, col. 4/lines 25-35). Carlson et al also teaches that it is well known in the art that the addition of an antireflection layer of proper thickness will increase the solar radiation traversing the metallic film and entering the device (col. 4/lines 10-25).

Unal et al and Carlson et al are of analogous art because they both teach the use of Schottky junctions in photovoltaic devices (Carlson et al col. 1/lines 20-25, Unal et al abstract). It would be obvious to one of ordinary skill in the pertinent art at the time of the invention to use the ITO layer deposited over the Schottky junction in Carlson et al in the photovoltaic device disclosed in Unal et al for the purpose of increasing the solar radiation traversing the metallic film and entering the device.

9. Claims 8-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Unal et al ("Spectral response of porous silicon based photovoltaic devices"), as applied to claims 6 and 7 above, in view of Lin (US 4990988).

Regarding claim 8, Unal et al teaches all of the limitations as stated above. Unal et al also teaches a process, characterized in that said first porous material is obtained by anodization, with an electric current of about 10 mA/cm2 (Table 1). However, Unal et al does not explicitly teach after a normal anodization step a solution of a metal

compound is introduced into the bath, which penetrates into the pores of the first porous material and gives rise to the reduction of the metal, on the first material.

Lin teaches a process, characterized in that said first porous material is obtained by anodization (col. 2/lines 30-40), with an electric current of about 10 mA/cm2 (col. 3/lines 20-30), and in that after a normal anodization step a solution of a metal compound is introduced into the bath, which penetrates into the pores of the first porous material and gives rise to the reduction of the metal, on the first material (col. 3/lines 28-50). Lin also teaches that the metal can be deposited by any other deposition technique that is capable of depositing metal on the walls of the pores with about 5 to 20 nm diameter (col. 3/lines 45-50).

Unal et al and Lin are of analogous art because they both teach Schottky junctions. It would be obvious to one of ordinary skill in the pertinent art at the time of the invention to use the anodization followed by electroplating process of Lin in producing the device in Unal et al for the purpose of saving time by using the current solution as a base for the electroplating process. Since other metallization processes (such as evaporation or sputtering) would require the device to be taken out of the bath and dried off, the use of electroplating would effectively eliminate these steps.

Regarding claims 9 and 10, modified Unal teaches all of the limitations as stated above. Regarding the limitations of the metal reduction is favored by inverting cell polarity during the final step of the process and the substrate made of the first material is made completely porous, with through pores, and a cathode and an anode are arranged after and before the substrate, in order for the electroplating process to work,

these steps must occur. It is therefore inherent that these steps must take place when implementing the electroplating process as disclosed in Lin.

Conclusion

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to ALEXANDER S. TUMMINELLI whose telephone number is (571)270-3878. The examiner can normally be reached on Monday-Thursday, 7:30am-5pm EST, Alt. Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Basia Ridley can be reached on (571)272-1453. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

AST

/Basia Ridley/
Supervisory Patent Examiner, Art Unit 4145